CLAIMS

1. An illumination device, comprising:

a light source; and

a lightguide element including an incidence surface for receiving light emitted from the light source and an outgoing surface from which the light incident from the incidence surface goes out;

wherein:

the lightguide element includes a polarization selection layer for causing light of a specific polarization direction, among the light incident from the incidence surface, to selectively go out from the outgoing surface, and a polarization conversion layer for converting light of a polarization direction, different from the specific polarization direction, into the light of the specific polarization direction; and

the polarization selection layer reflects the light of the specific polarization direction substantially only toward the outgoing surface.

2. The illumination device of claim 1, wherein the polarization selection layer includes a plurality of inclining dielectric films provided at a predetermined angle with respect to the outgoing surface.

3. An illumination device, comprising:

a light source; and

a lightguide element including an incidence surface for receiving light emitted from the light source and an outgoing surface from which the light incident from the incidence surface goes out;

wherein:

the lightguide element includes a polarization selection layer for causing light of a specific polarization direction, among the light incident from the incidence surface, to selectively go out from the outgoing surface, and a polarization conversion layer for converting light of a polarization direction, different from the specific polarization direction, into the light of the specific polarization direction; and

the polarization selection layer includes a plurality of inclining dielectric films inclining with respect to the outgoing surface, and the plurality of inclining dielectric films are arranged increasingly densely as becoming farther from the incidence surface.

4. The illumination device of claim 3, wherein:

the lightguide element includes a first member having a main surface which includes a plurality of inclining surfaces inclining with respect to the outgoing surface and a plurality of parallel surfaces generally parallel to the outgoing surface, and a second member provided on the main surface of the first member for flattening the main surface;

the plurality of inclining dielectric films are respectively formed on the plurality of inclining surfaces of the main surface; and

the plurality of parallel surfaces of the main surface are arranged increasingly sparsely as becoming farther from the incidence surface.

5. The illumination device of claim 4, wherein the polarization selection layer includes a plurality of further dielectric films respectively formed on the plurality of parallel surfaces of the main surface.

6. The illumination device of claim 5, wherein the polarization selection layer is located in the vicinity of the outgoing surface and closer to the outgoing surface than the polarization conversion layer.

7. The illumination device of claim 6, wherein the plurality of parallel surfaces are located closer to the outgoing surface than the plurality of inclining surfaces.

8. The illumination device of claim 5, wherein the lightguide element further includes a counter surface facing the outgoing surface, and the polarization selection layer is located in the vicinity of the counter surface and closer to the counter surface than the polarization conversion layer.

9. The illumination device of claim 8, wherein the plurality of parallel surfaces are located closer to the counter surface than the plurality of inclining surfaces.

10. The illumination device of any one of claims 4 through 9, wherein the first member is a prism sheet including a plurality of prisms arranged on the main surface.

11. The illumination device of any one of claims 4 through 10, wherein the second member is a transparent resin layer formed of a transparent resin material.

12. The illumination device of any one of claims 1 through 11, wherein the polarization conversion layer is formed of a transparent material having birefringence.

13. The illumination device of claim 12, wherein the polarization conversion layer is an injection-molded transparent resin layer.

14. The illumination device of claim 12, wherein the polarization conversion layer is a phase plate.

15. The illumination device of claim 14, wherein directions of a slow axis and a fast axis of the phase plate in a plane parallel to the outgoing surface do not match the specific polarization direction.

16. An illumination device, comprising:

a light source; and

a lightguide element including an incidence surface for receiving light emitted from the light source and an outgoing surface from which the light incident from the incidence surface goes out;

wherein:

the lightguide element includes a polarization selection layer for causing light of a specific polarization direction, among the light incident from the incidence surface, to selectively go out from the outgoing surface, and a polarization conversion layer for converting light of a

polarization direction, different from the specific polarization direction, into the light of the specific polarization direction; and

the polarization conversion layer is an injection-molded transparent resin layer having birefringence.

17. An illumination device, comprising:

a light source; and

a lightguide element including an incidence surface for receiving light emitted from the light source and an outgoing surface from which the light incident from the incidence surface goes out;

wherein:

the lightguide element includes a polarization selection layer for causing light of a specific polarization direction, among the light incident from the incidence surface, to selectively go out from the outgoing surface, and a polarization conversion layer for converting light of a polarization direction, different from the specific polarization direction, into the light of the specific

polarization direction;

the polarization conversion layer is a phase plate; and

directions of a slow axis and a fast axis of the phase plate in a plane parallel to the outgoing surface do not match the specific polarization direction.

18. The illumination device of claim 15 or 17, wherein the phase plate has monoaxial refractive index anisotropy.

19. The illumination device of claim 18, wherein a refractive index n_x in the direction of the slow axis of the phase plate, a refractive index n_y in the direction of the fast axis of the phase plate, a refractive index n_z in a thickness direction of the phase plate, a thickness d of the phase plate, a wavelength λ of visible light, and an angle α made by the specific polarization direction and the slow axis of the phase plate fulfill the relationship of $(n_x - n_z)/(n_x - n_y) \fallingdotseq 0$, $0 < (n_x - n_y) \cdot d < \lambda$, and $10° < \alpha < 30°$ or $40° < \alpha < 60°$.

20. The illumination device of claim 18, wherein a refractive index n_x in the direction of the slow axis of the phase plate, a refractive index n_y in the direction of the fast axis of the phase plate, a refractive index n_z in a thickness direction of the phase plate, a thickness d of the phase plate, a wavelength λ of visible light, and an angle α made by the specific polarization direction and the slow axis of the phase plate fulfill the relationship of $(n_x - n_z)/(n_x - n_y) \fallingdotseq 0$, $(n_x - n_y) \cdot d = \lambda/2$, and $10° < \alpha < 30°$.

21. The illumination device of claim 18, wherein a refractive index n_x in the direction of the slow axis of the phase plate, a refractive index n_y in the direction of the fast axis of the phase plate, a refractive index n_z in a thickness direction of the phase plate, a thickness d of the phase plate, a wavelength λ of visible light, and an angle α made by the specific polarization direction and the slow axis of the phase plate fulfill the relationship of $(n_x - n_z)/(n_x - n_y) \fallingdotseq 1$, $\lambda/4 < (n_x - n_y) \cdot d < 5\lambda/4$, and $20° < \alpha < 90°$.

22. The illumination device of claim 18, wherein a refractive index n_x in the direction of the slow axis of the phase plate, a refractive index n_y in the direction of the fast axis of the phase plate, a refractive index n_z in a thickness direction of the phase plate, a thickness d of the phase plate, a wavelength λ of visible light, and an angle α made by the specific polarization direction and the slow axis of the phase plate fulfill the relationship of $(n_x - n_z)/(n_x - n_y) \fallingdotseq 1$, $(n_x - n_y) \cdot d = \lambda/2$, and $20° < \alpha < 80°$.

23. The illumination device of claim 15 or 17, wherein the phase plate has biaxial refractive index anisotropy.

24. The illumination device of claim 23, wherein a refractive index n_x in the direction of the slow axis of the phase plate, a refractive index n_y in the direction of the fast axis of the phase plate, a refractive index n_z in a thickness direction of the phase plate, a thickness d of the phase plate, a wavelength λ of visible light, and an angle α made by the specific polarization direction and the slow axis

of the phase plate fulfill the relationship of $0.6 < (n_x - n_z)/(n_x - n_y) < 0.9$, $\lambda/4 < (n_x - n_y) \cdot d < 3\lambda/4$, and $60° < \alpha < 80°$.

25. The illumination device of claim 23, wherein a refractive index n_x in the direction of the slow axis of the phase plate, a refractive index n_y in the direction of the fast axis of the phase plate, a refractive index n_z in a thickness direction of the phase plate, a thickness d of the phase plate, a wavelength λ of visible light, and an angle α made by the specific polarization direction and the slow axis of the phase plate fulfill the relationship of $0.6 < (n_x - n_z)/(n_x - n_y) < 0.9$, $(n_x - n_y) \cdot d = \lambda/2$, and $60° < \alpha < 80°$.

26. The illumination device of any one of claims 1, 4 and 16, wherein the polarization conversion layer is located oppositely to the outgoing surface with the polarization selection layer interposed therebetween.

27. The illumination device of any one of claims 1, 4

and 17, wherein the polarization conversion layer is located closer to the outgoing surface than the polarization selection layer.

28. An image display apparatus, comprising:

the illumination device of any one of claims 1 through 27; and

a display panel provided on the outgoing surface side of the lightguide element of the illumination device and including at least one polarizer.

29. The image display apparatus of claim 28, wherein the illumination device further includes a transparent input device formed on the counter surface of the lightguide element.

30. The image display apparatus of claim 29, wherein:

the display panel includes a substrate; and

the lightguide element included in the illumination device acts as the substrate.

31. A lightguide element including an incidence surface for receiving light emitted from a light source and an outgoing surface from which the light incident from the incidence surface goes out;

wherein:

the lightguide element further includes a polarization selection layer for causing light of a specific polarization direction, among the light incident from the incidence surface, to selectively go out from the outgoing surface, and a polarization conversion layer for converting light of a polarization direction, different from the specific polarization direction, into the light of the specific polarization direction; and

the polarization selection layer reflects the light of the specific polarization direction substantially only toward the outgoing surface.

32. A lightguide element including an incidence surface for receiving light emitted from a light source and an

outgoing surface from which the light incident from the incidence surface goes out;

wherein:

the lightguide element further includes a polarization selection layer for causing light of a specific polarization direction, among the light incident from the incidence surface, to selectively go out from the outgoing surface, and a polarization conversion layer for converting light of a polarization direction, different from the specific polarization direction, into the light of the specific polarization direction; and

the polarization selection layer includes a plurality of inclining dielectric films inclining with respect to the outgoing surface, and the plurality of inclining dielectric films are arranged increasingly densely as becoming farther from the incidence surface.

33. A lightguide element including an incidence surface for receiving light emitted from a light source and an outgoing surface from which the light incident from the

incidence surface goes out;

wherein:

the lightguide element further includes a polarization selection layer for causing light of a specific polarization direction, among the light incident from the incidence surface, to selectively go out from the outgoing surface, and a polarization conversion layer for converting light of a polarization direction, different from the specific polarization direction, into the light of the specific polarization direction; and

the polarization conversion layer is an injection-molded transparent resin layer having birefringence.

34. A lightguide element including an incidence surface for receiving light emitted from a light source and an outgoing surface from which the light incident from the incidence surface goes out;

wherein:

the lightguide element further includes a polarization selection layer for causing light of a specific polarization

direction, among the light incident from the incidence surface, to selectively go out from the outgoing surface, and a polarization conversion layer for converting light of a polarization direction, different from the specific polarization direction, into the light of the specific polarization direction;

the polarization conversion layer is a phase plate; and

directions of a slow axis and a fast axis of the phase plate in a plane parallel to the outgoing surface do not match the specific polarization direction.